Choose a lift and walk into it: Manifesting Choice Blindness in Real-life scenarios using immersive Virtual Reality

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ABSTRACT

In this paper, we propose the novel concept of manifesting the Choice Blindness paradigm in real-life scenarios through immersive Virtual Reality (VR). We designed a VR application wherein the participants encountered two-alternative choices regarding implicit racial bias. Our observations show that 92% of subjects failed to notice a mismatch in their choices, while 75% exhibited choice blindness, hence indicating a healthy scope for exploring choice blindness through virtual reality.

Author Keywords

Choice Blindness; Virtual Reality; Preference changes.

INTRODUCTION

Choice Blindness (CB) refers to the cognitive blind spot of people in noticing dramatic mismatches between the intended and the actual outcome of their choices and actions [5]. A typical CB scenario includes the participant being presented with a two-alternative choice, whose outcome is then reversed by the experimenter in a covert manner, unknown to the participant. In one such experiment, participants were shown pairs of pictures of female faces and were asked to choose the face they found more attractive. A double-card ploy trick was sometimes used to exchange one face for the other. The experiment showed that majority of participants failed to notice the manipulation, while still being prepared to offer introspective reasons for why they chose the way they thought they had, i.e. to justify the originally rejected face [6]. The phenomenon has been shown to produce similar, robust effects to decision making tasks regarding abstract artistic patterns, the smell and taste of different consumer products, and even moral preferences [2, 1]. In this note, we propose the novel concept of manifesting the CB paradigm in real-life scenarios through immersive Virtual Reality (VR).

Virtual Reality aims to create an alternate reality for the user; the user is made to believe that the (virtual) place and the corresponding events happening around him are real, hence inducing realistic behaviour [8]. However, the user is still in a simulated space that can easily be manipulated as per the experiment design. This combination of ecological validity and experimental control has turned VR into a popular choice to conduct research related to behavioral phenomena [3]. In context of the CB paradigm, VR can enable testing in a variety of decision making scenarios. Traditionally, CB experiments have been conducted through physical media (like cards) [5, 6]; the dynamism of VR can allow for easy presentation of multimodal stimuli. Similarly, in comparison to simple card tricks, VR can support infinite methods to enable choice reversal in ways that are hidden from the user. Moreover, owing to the ecological validity, the act of choice making can be merged into everyday practices like walking into one of the two lifts (as in this project,) rather than being limited to strictly experiment settings. CB has been observed to cause preference changes in moral issues [1]. Hence, exposure to such scenarios in real-life setting through VR might be helpful to cause desirable changes in behaviour like bias reduction, etc.

In this paper, we present our first effort in exploring this rich space. We developed a VR application wherein the participant encounter a two-alternative choice regarding implicit racial bias [7]. We present the application and preliminary findings from testing it with 17 subjects. We discuss the critical design parameters for incorporating CB in VR, setting the foundation for future research.

CHOOSE A LIFT AND WALK INTO IT

Choose a lift and walk into it is a VR application that manifests the Choice Blindness paradigm in participant decisions regarding implicit racial bias. The participants are required to choose between two lifts: one with virtual avatars (VA's) having a *white*, and second with VA's of *dark* skin. As the user chooses and enters into one of the lift, the VA's in two lifts are swapped, reversing the outcome of the choice made by the user. The CB experiment procedure as described in literature has two main phases: choice presentation and choice making; and choice explanation. Our experiment procedure (Fig. 1) included another phase to allow the participants to get accustomed to VR. Next we describe the specific design features of these phases that we had added to the VR application.

Phase 1: Getting accustomed to VR

The goal of this phase was to let the user get accustomed to the virtual environment of the experiment that consisted of a lift lobby and two lifts (corresponding to the choice alternatives.) The user was prompted to walk around the lobby and let the experimenter know once he was comfortable. This allowed

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Figure 1. Application design [A: Emergency situation, B: Virtual avatars before swapping, C: Virtual avatars after swapping , D: Choice explanation]

the user to try out the mapping between the physical space and the virtual environment as he walked around. Moreover, many of our subjects experienced VR for the first time when participating in the experiment. Hence, this phase was helpful for them before the actual experiment started.

Phase 2: Choice making and manipulation

This phase corresponds to choice presentation (two lifts with the VA's) and choice making (walking into one of the lifts). The presence of white-skinned and dark-skinned VA's in the two lifts was randomized across trials to eliminate any biases regarding going into left or right directions, and hence choosing a specific lift. Johansson et al. have defined *deliberation time* (time given to make the choice) as a significant design parameter during this segment [5]. They had reported that free (unfixed) deliberation time leads to higher choice manipulation detection than fixed time conditions. To incorporate this requirement into our VR scenario in a natural manner, we envisioned an *emergency situation*(Fig. 1.A). The users are informed regarding this situation using visual (text, flickering lights) and audio cues (relatively mild siren sound), and are coerced to choose and get into a lift quickly — hence lower deliberation time. As the user moves towards a lift (choosing it) and is about enter, the VA's in the two lifts are swapped (Fig. 1.B-C), right in front of the user's eyes. The lift's door is quickly closed and re-opened to achieve this effect, without the user noticing it.

Phase 3: Choice explanation

During this phase, the user is asked to explain the manipulated choice, the one he supposes to have made but is actually reversed. This happens in two parts. First, the experimenter converses with the user while he is in the experience (standing in the lift with the VA's). To achieve this, the video feed of the experimenter is fed to a screen within the lift. By asking the user about his experience of the application, and by asking if he had felt anything weird, the experimenter aims to check if the user noticed the swap of the VA's. Next, in the second part, the user is brought to point wherein the choice was made and is asked to justify the reversed outcome. A green indication is added on one of the lifts to mark the user's choice (Fig. 1.D).

OBSERVATIONS

We conducted the experiment with 17 subjects and report on the preliminary findings. Firstly, 4 subjects recognized the difference between the VA's in the two lifts (i.e. skin color) during phase 2 and made conscious choices to enter into one of the lifts. Hence, these subjects were not suitable to test CB and were ignored from analysis. Surprisingly, 12 out of the 13 remaining subjects didn't notice the swapping of the VA's between the two lifts. Only 1 subject noticed the swapping in retrospection when being asked to justify the manipulated choice in phase 3. The percentage of the subjects (92%) who failed to notice a manipulation of their choice is higher than the percentage generally observed in the past (non VR) experiments. However, a relatively small sample size may have lead to this observation. During the phase 3, all subjects recognized the different skin color of the VA's in the two lifts. When asked to justify the reversed choice, 8 out of 12 (75 %) subjects exhibited signs of CB. They came up with a variety of confabulated explanations related to skin color, clothing of the VA's, their arrangement in the lifts, etc. to back up the reversed choices; the remaining 4 either called their decisions instinctive or gave some other reasons, irrelevant to the scope of CB. Interestingly, 3 subjects attributed the perceived choice to the green indicator which was actually absent in phase 2, was added in phase 3 to indicate the subject's choice.

DISCUSSION

Johansson et al. have tested the CB paradigm in desktop based virtual environments [4]. They marked participant's *trust* on the experimenter and virtual world as critical factors causing the CB effect. To cater to this requirement, we showed the video feed of human experimenter in the VR to interview the participant rather than using a virtual counterpart. Moreover, the success of this early experiment (low detection of choice reversal, confabulated explanations) indicates that the participants were able to trust that their choices *could* not have been manipulated without them noticing. Though the findings are preliminary, we can argue that our design of CB scenarios in VR satisfies the requirements of participants' trust.

CONCLUSION & FUTURE WORK

In this work, we were able to successfully manifest the CB paradigm into a real-life scenario (selecting and moving into a lift) using VR. In future, we plan to expand this exploration in three ways. Firstly, we will use this application design to test CB in decisions other than the ones based on racial bias. The dynamism afforded by VR will allow us to easily change the stimuli regarding the choices. Secondly, we will explore other newer real-life scenarios to incorporate CB affected decision making. Finally, we will explore the use of such applications for desirable behavioral changes, like reduction in biases.

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